RQ-8A FIRESCOUT VERTICAL TAKEOFF AND LANDING TACTICAL UNMANNED AERIAL VEHICLE SYSTEM (VTUAV)

The Vertical Takeoff and Landing (VTOL) Tactical Unmanned Aerial Vehicle (VTUAV) system is required to provide Reconnaissance, Surveillance, and Target Acquisition (RSTA) and communications relay capability in support of littoral operations for the Navy and Marine Corps. The purpose of the VTUAV system is to collect and pass information utilizing an airborne sensor platform that will provide the commander an extended and enhanced battlespace situational awareness. The VTUAV will incorporate an Electro-Optic/Infrared/Laser designator payload and should deliver timely, accurate, and complete information about the Commander's area of interest in near real-time.

A VTUAV system consists of air vehicles with payloads, a ground control element (ship-based for the Navy and vehicle-based for the Marine Corps), data link equipment, a remote data terminal, and associated ground support equipment. The Fire Scout air vehicle is based on the Schweizer Aircraft Corporation Model 330 manned turbine helicopter. The most significant change from the manned version is the replacement of the cockpit with a redundant flight control system including actuators, avionics, and software to support unmanned flight and payload operations. The Fire Scout has a gross takeoff weight of 2,550 pounds, cruises at 110 knots, and is intended to loiter on-station at 110 nautical miles for over 3 hours. An existing Allison Rolls Royce gas turbine engine powers the air vehicle. The ground control element will use the Tactical Control System (TCS) architecture to support system functionality and intelligence product dissemination to other C4I nodes.

The operational tempo calls for one VTUAV system to provide 12 continuous hours on-station at 110 nautical miles. This will be accomplished with more than one air vehicle and conducting relief-on-station operations. The command and control architecture using the tactical common data link and AN/ARC 210 UHF/VHF radio allows one ground station to monitor up to three air vehicles simultaneously, while receiving imagery from one of the airborne platforms.

BACKGROUND INFORMATION

In November 1998, the JROC directed the Navy and the Army to pursue separate air vehicle solutions to satisfy their tactical UAV requirements, and the Navy submitted their operational requirement for a vertical takeoff and landing tactical UAV. The JROC subsequently validated the Navy's VTUAV ORD in January 1999, with the following Key Performance Parameters (KPPs): ability to conduct VTOL operations from a land-based site and all air-capable ships; ability to maintain a steady

state hover; automatic launch and recovery capability; 200 pound payload capability; deck restraining capability; ability to transfer control of the air vehicle from one ground control station to another; and ability to use either JP-5 or JP-8 heavy fuel. An interoperability KPP was added to the ORD that stipulates nine interfaces with which the VTUAV must be interoperable.

The Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN(RDA)) approved Milestone II in January 2000. The first of two LRIP decisions will be for the purchase of one USMC VTUAV system consisting of three air vehicles, two remote data terminals, two ground control stations (GCS), shipboard GCS installation (although there may be problems here as described below), and associated support equipment, documentation, and training.

Prior to the Milestone II, 39 manned flights of the Model 379 for a total of 41 flight hours were accomplished. In January 2000, the first unmanned fully autonomous flight took place at NAWC China Lake, and the same prototype air vehicle (P1) successfully completed additional flight testing in June 2000. In November 2000, after a successful autonomous flight, the air vehicle crashed into the ground and was totally destroyed. Post-crash analysis attributed the mishap to an improperly installed radar altimeter antenna. As a result of the mishap, a manned air vehicle was inserted into the developmental flight test program.

TEST & EVALUATION ACTIVITY

The manned air vehicle has flown over 60 flight hours in support of risk reduction flight testing. Flight testing with the manned platform continued in anticipation of availability of another unmanned prototype in late 2001, but support for the program inside the navy waned in late 2001, in favor of expected participation in other UAV programs.

Commander, Operational Test and Evaluation Force (COMOPTEVFOR) and the Marine Corps Operational Test and Evaluation Activity (MCOTEA) completed an operational assessment (OA, OT-IIA) during April 2001. The purpose of OT-IIA was to assess the potential operational effectiveness and potential operational suitability of the VTUAV system to support a decision to field low rate initial production lot 1 (LRIP 1). OT-IIA consisted of analyses of limited flight data, manned air vehicle data, and the developer's proposal. Subject matter experts from Marine Unmanned Aerial Vehicle Squadrons ONE (VMU-1) and TWO (VMU-2), Navy Fleet Composite Squadron Six (VC-6), and engineers from Ryan Aeronautical Center and Naval Air Systems Command were consulted.

TEST & EVALUATION ASSESSMENT

COMOPTEVFOR's OA rated the VTUAV system as potentially operationally effective and potentially operationally suitable. The primary risk to the program is its dependence on the TCS for its ground control element; without the TCS, the VTUAV cannot be an effective system.

Final recommendations from the OA were to continue program development; however, fielding was not recommended until the current concept of employment with respect to forward basing or CONUS basing is reviewed. The OA also found that the VTUAV requirement to "be capable of conducting VTOL operations at 4,000 feet density altitude (DA) from all air-capable ships and be capable of conducting VTOL operations at 4,000 feet DA from an unprepared land-based site (threshold/KPP)" is operationally restrictive; that the Fire Scout air vehicle's inability to be delivered via vertical replenishment may unduly restrict the system's capability to operate from remote and austere

locations; that the VTUAV system will likely exceed set-up and pack-up timelines by several fold; and that although the VTUAV will likely meet the 25 meter spherical error probable/target location error requirement, it is inadequate for precision weapons guidance.

When fielded, it is envisioned that the VTUAV will be operated from LPD-class amphibious ships. As it now stands, this is the LPD 4 class. In the future, LPD 4 class ships will be retired and replaced by LPD 17 class ships. As a matter of Navy policy, systems are not allowed to achieve IOC on ships that will be retired in the next 5 years. Therefore, a production representative VTUAV system will not be installed aboard an LPD 4 class ship, and VTUAV must await introduction of LPD 17 to conduct OPEVAL aboard an amphibious ship. Delivery of the first LPD 17 will be approximately November 2004. A separate B-LRIP report must be generated after OT-IIIB to support the decision for full-rate production of the sea-based system.

A second shipboard issue is the required use of a landing grid in order to launch and recover the VTUAV. This grid was originally envisioned as a mobile platform that would be positioned on the flight deck for every launch and recovery of the VTUAV. However, the use of a mobile landing grid would prevent the VTUAV from meeting its ORD launch and recovery timelines. As a result, the landing grid is now envisioned to be a fixed, integral part of each LPD 17 flight deck. It might be too late to make the landing grid part of the initial ships of the LPD 17 class. In this case, early LPD 17 flight decks would have to be retrofitted with the landing grid, at a significant cost increase.

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